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ABSTRACT

In reflecting on an overview of research on microcomputers in the public schools, a researcher found that early programs were largely based on a programmed instruction model. Computers were primarily used to provide for simple repetition of low-level decoding tasks. The emphasis of whole language literacy is in direct contrast to this approach. Rather than teaching the various aspects of communication as separate entities, whole language focuses on the integration of the communication skills of listening, speaking, writing, and reading. The computer can be a valuable tool for helping to immerse children in an environment in which print is filled with meaning. A computer-based program, "Writing to Read," was developed by IBM to enhance writing and reading skills of kindergarten and first grade students by increasing students' understanding of sounds, words, and sentence structure. Based on the success nationally of the "Writing to Read" program, 20 "Writing to Read" programs funded by state grants in Louisiana were evaluated to determine their effectiveness. Results revealed similar statistics to those found nationally: (1) increased gain scores on word recognition and vocabulary; (2) improved writing samples; (3) increased ability to remain on task; (4) greater self-confidence; (5) fewer retentions; and (6) enthusiastic support from teachers and parents. An IBM "Writing to Read" lab was installed in a local Chapter 1 school in a low socioeconomic area. Results after the first full year of operation are similar to results achieved state-wide. (Three tables of data are included.) (RS)

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LITERACY: THE IMPACT OF TECHNOLOGY ON EARLY READING

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"Literacy: The Impact of Technology on Early Reading"

Presently, there is in the public schools, what might be called a "microcomputer revolution". The computer itself has been used in education for the past 25 years: the microcomputer, for the past ten years. Use of microcomputers in schools has increased dramatically over the past five years. The jury is still out, however, on the effect of the microcomputer on instruction. student achievement attitudes, dropout rate, and learning time (Roblyer. 1990).

Becker (1986) conducted a review of research on the effectiveness of computer-assisted instruction. He found that about one-half of all activities on school computers involved drill-and-practice and tutorial CAI in math, language-arts, and other subjects. He found that about 15% of all computer time was devoted to word-processing activities. Most importantly, however, he found that existing studies at that time were badly out-dated. and that most newly completed studies were inadequate in size, scope, or design.

A meta-analysis procedure was used to study and summarize data from research reviews relating to computer-use in the public schools in 1989 (Roblyer. Castine. and King. 1989). An overall finding was that use of the computer in public school had a significantly positive effect in a majority of the areas studied. Larger effects were found at college and adult levels than at elementary and secondary levels. Computer applications seemed to have slightly greater effects with mathematics than with

reading/language skills, but not a statistically significant difference. Using computers to teach cognitive skills (problem-solving and critical thinking) was equally effective. One of the highest effects observed in the review was for science, but the number of studies in that area was limited. No evidence was found to indicate that the effectiveness of computer-use was affected by student ability level or gender.

The effectiveness of drill-and-practice and tutorial applications of computer-use were analyzed; effects seemed slightly higher for tutorials in reading, but data did not allow for firm conclusions as to the superiority of any type of application. Word-processing seemed to have a positive effect on student attitudes toward writing. No conclusions could be drawn regarding the effect of word-processing on writing quality, length of composition, or number and kinds of revisions.

The positive effects of LOGO applications on problem-solving and general thinking skills were found to be statistically significant. Effects of "problem-solving" CAI were not found to be different from zero. In the area of student creativity, LOGO-based studies showed a higher effect overall than any other found in the review.

Several writers (Swick, 1989; Troutner, 1989; Tsantis, Wright, and Thouvenelle, 1989) recommend introducing even preschool children to computers, in order to foster interest, familiarity, self confidence, and self-esteem. Early introduction to computers allows young children access to computer use as an information source and as a communication

tool. It encourages exploration and understanding of technology. enhances problem-solving skills. and builds self-confindence and self-esteem. Some programs recommended for use with young children are "Facemaker". (a software package produced by Spinnaker): "Fantastic Animals." (Firebird): "The Garden." (DIL): "Muppets on Stage." (Sunburst Communications): the "Stickybear" series. (Hartley Courseware. Inc.): and the "Bouncy Bee" series. (IBM).

Some cautions regarding computer-use were posited by the Laboratory of Comparative Human Cognition (1989) in a recent article in the Harvard Educational Review. A national survey of 1.082 schools using microcomputers revealed that more computers were being placed in middle- and upper-class schools than in poor schools: that computers in schools for poor children were being used for drill-and-practice. rather than for teaching cognitive skills as for middle-and upper-class students: and that female students had less involvement than male students with computers in all schools. irrespective of class or ethnicity.

In reflecting on an overview of research on microcomputers in the public schools. early programs were found to be largely based on a programmed instruction model. Computers were primarily used to provide for simple repetition of low-level decoding tasks. These programs were motivational and provided for immediate feedback to students. On the negative side. however. they did not utilize the full potential of the computer. and this type of learning could have been accomplished through less expensive means.

The emphasis on whole language literacy today is in direct contrast to this approach. Rather than teaching the various aspects of communication as separate entities, whole language focuses on the integration of the communication skills of listening, speaking, writing, and reading. The computer can be a valuable tool for helping to immerse children in an environment in which print is filled with meaning. Whole language advocates believe that children learn to read by reading and by being read to, and that they learn to write by writing.

Important knowledge of print can be learned through actively constructing and testing hypotheses concerning written language (Bissex, 1980; Ferreiro & Teberosky, 1982). Early literacy programs based on whole language research findings offer children opportunities to read favorite stories, and to develop an understanding of letter-sound relationships by writing and reading their own stories. Writing is an effective means of focusing thinking and helps children to see a clear relationship between writing and reading (Tierney and Leys, 1984). Because the processes of reading and writing are similar, correlating activities in the two areas makes them mutually supportive.

In the whole language environment, children select those new symbols called "words" and use them to create stories of their own. Children learn that they may use invented spellings to spell words as they think they are spelled. After stories have been written, children often read them to their classmates and may exchange stories for reading pleasure. Most children have a sufficient command of the language to be able to write when they

have something to say. especially when they know that what they have to say will be valued.

A computer-based program. Writing to Read. was developed by John Martin for IBM. This program was designed to enhance writing and reading skills of kindergarten and first grade students. The program involves setting up learning centers organized into five learning stations. each designed to increase understanding of sounds. words. and sentence structure. A two-year evaluation of the program was conducted by Educational Testing Service. The population studied consisted of students randomly selected from schools in low-income areas. Evaluators found an increase of 17.4 percent over the preceding year in the number of children scoring at or above the 40th percentile level (required to begin first grade). In schools using traditional methods only. the increase was only 2.3 percent (Educational Testing Service. 1984).

Based on the success of the Writing to Read program nationally. the state of Louisiana made funds available for competitive grants to school systems interested in establishing these programs. Twenty Writing to Read projects funded by state grants in Louisiana were evaluated in order to determine their effectiveness (See Table 1). These programs served 49 schools. Over seven thousand kindergarten and first grade students and three hundred teachers were affected by the programs. Evaluation revealed similar statistics to those found nationally: increased gain scores on word recognition and vocabulary: improved writing samples: increased ability to remain on task: greater

self-confidence: fewer retentions: and enthusiastic support from teachers and parents.

In January of 1989. an IBM Writing-to-Read Lab was installed in a local Chapter I school. This school is located in a low socoeconomic area. with about one-third of its student population living in a federal low-income housing area. A survey of the school population showed that 30% of the parents of these students had completed only five or less years of schooling.

The program was in place for only four months (February - May) in 1989. Nonetheless. differences in student performance at the kindergarten level were noted. There was no difference in first grade performance. However. at the end of the first full year of operation (1989-90) differences were noted at both the kindergarten and first grade levels. It is projected that first grade achievement scores will show even greater improvements when the students have had two full years in the program (1990-91). Results of achievement test are shown in Tables 2 and 3.

Table 1

Writing to Read: Participating Schools

Grant No.	No. Schools	No. Students	No. Teachers
#3	2	488 (K.1)	24
#5	2	66 (K.1)	5
#6	1	152 (K.1)	7
#8	4	230 (K.1)	14
#9	2	252 (K.1)	10
#12	4	569 (K.1)	27
#15	1	59 (K.1)	4
#20	3	650 (K.1)	29
#21	1	660 (K.1)	27
#24	2	236 (K.1)	13
#26	1	154 (K.1)	8
#27	1	54 (K.1)	3
#34	1	261 (K.1)	10
#35	7	968 (K.1)	45
#37	1	129 (K.1)	6
#41	7	1050 (K.1)	42
#53	4	350 (K.1)	15
#54	1	123 (K.1.2)	9
#74	3	575 (K.1)	26
#75	1	258 (K.1)	12
TOTALS	49	7,284	336

TABLE 2

END-OF-YEAR ACHIEVEMENT TEST SCORES

KINDERGARTEN

Percent of Student Population Scoring

in Each Quartile

Year	Lowest (1-25)	Second (26-50)	Third (51-75)	Top (76-99)
Pre-W-to-R				
1987-88	73%	11%	10%	6%
4 mos W-to-R				
1988-89	32%	25%	27%	16%
Full year W-to-R				
1989-90	23%	13%	13%	51%

TABLE 3

END-OF-YEAR ACHIEVEMENT TEST SCORES

FIRST GRADE

Percent of Student Population Scoring in Each Quartile

Year	Lowest (1-25)	Second (26-50)	Third (51-75)	Top (76-99)
Pre W-to-R 1987-88	39%	37%	20%	4%
4 mos W-to-R	40%	40%	14%	6%
Full year W-to-W 1989-90	25%	23%	44%	8%

In summary, technology seems indeed to be having an impact on early reading. As a result of the increase of microcomputers in kindergarten and first grade classrooms across the state, teachers are reporting that more kindergarten students are ready for formal first grade reading instruction. There are fewer retentions, reading and writing scores have improved, and students show increased motivation and self-confidence. Increased longitudinal research studies on the effects of microcomputers on early reading is recommended, however, in order to more fully understand their role in building literacy skills.

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